

Therapeutic efficacy of treatment measures for strongylidoses of sheep digestive tract

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Article info

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Invasion diseases are the most widespread in the world and cause significant economic losses to the sheep farming. Gastro-intestinal strongylidoses of sheep are among the most relevant. These diseases are mainly chronic and are accompanied by damage to the intestinal and abomasum mucous lining and decrease in animal productivity. Today, anti-helminthic means are used as one of the fastest and most convenient methods of fighting strongyles of sheep digestive tract. However, despite a large choice of such preparations both on the world market and in Ukraine, veterinary specialists are more often noting a decrease in their effectiveness. Previous studies by scientists have shown that the development of resistance in nematodes to anti-helminthic agents is connected with their excessive and uncontrolled use. Therefore, the purpose of the study was to give an assessment of the anti-helminthic efficacy of Closantel 10 %, Doramax and Brovermectin 1 % preparations. The drugs were administered subcutaneously to the animals, once, according to the instructions for their use. The results of the conducted studies show that macrolide-based anti-helminthics (Doramax and Brovermectin 1 %) were more effective than Closantel 10 % (EE – 90.0 %; IE – 95.35 %) in case of the digestive tract strongylidoses on the 7th day of the experiment (EE and IE – 100 %). On the 14th day, the extensive effectiveness and intensive effectiveness of the above mentioned anti-helminthics made 100% in case of the digestive tract strongylidoses. According to our data and the indicators of general clinical observations, it was found that after the application of Closantel 10 %, Doramax and Brovermectin 1%, no side effects were observed in animals during the experiment. However, in the future, it is necessary to pay attention to Closantel 10 % with DR Closantel, since in the near future, helminthes may develop resistance to this preparation. The obtained results will contribute to raising the efficacy of treatment and preventive measures against sheep digestive tract strongylidoses on sheep farms of various forms of ownership.

Keywords: parasitology, sheep, digestive system strongylidoses, treatment, effectiveness.

Терапевтична ефективність лікувальних заходів за стронгілідозів травного тракту овець

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Інвазійні хвороби є найбільш поширеними в усьому світі та завдають значних економічних збитків галузі вівчарства. Стронгілідози шлунково-кишкового тракту у овець за актуальністю посідають одне із провідних місць. Вказані захворювання перебігають переважно хронічно та супроводжуються пошкодженням слизової оболонки кишечника й сичуга та зниженням продуктивності у тварин. Сьогодні антигельмінтні засоби використовують як один із найшвидших і найзручніших методів боротьби зі стронгілідами травного каналу у овець. Проте, незважаючи на значний вибір таких препаратів як на світовому ринку, так і в Україні, ветеринарні фахівці дедалі частіше відзначають зниження їхньої ефективності. Попередні дослідження науковців показали, що розвиток резистентності у нематод до антигельмінтних засобів пов'язаний із надмірним та неконтрольованим їх застосуванням. Тому метою дослідження було надати оцінку антигельмінтної ефективності препаратів Клозантел 10 %, Дорамакс та Бровермектин 1 %. Препарати вводили тваринам підшкірно, одноразово згідно інструкцій до їх використання. Результати проведених досліджень свідчать, що антигельмінтики на основі макролідів (Дорамакс та Бровермектин 1 %) виявилися більш ефективними, ніж Клозантел 10 % (ЕЕ – 90,0 %; ІЕ – 95,35 %) за наявності стронгілідозів органів травлення на 7-му добу експерименту (ЕЕ та ІЕ – 100 %). На 14-ту добу екстенсивність та інтенсивність вказаних вище антигельмінтиків становила 100 % – за наявності стронгілідозів травного тракту. Згідно наших даних, за показниками загальноклінічних спостережень з'ясовано, що після застосування Клозантелу 10 %, Дорамаксу та Бровермектину 1 % побічних ефектів у тварин упродовж експерименту не спостерігали. Однак, в подальшому необхідно звернути увагу на Клозантел 10 % з ДР клозантел, оскільки в найближчому майбутньому у гельмінтів можливий розвиток резистентності до даного препарату. Отримані результати сприятимуть підвищенню ефективності лікувально-профілактичних заходів проти стронгілідозів травного каналу у вівчарських господарств різних форм власності.

Ключові слова: паразитологія, вівці, стронгілідози органів травлення, лікування, ефективність.**Бібліографічний опис для цитування:** Бондаревський І. Л. Терапевтична ефективність лікувальних заходів за стронгілідозів травного тракту овець. *Scientific Progress & Innovations*. 2025. № 28 (1). С. 124–127.

Introduction

Among the most widespread infestations of sheep, gastro-intestinal tract nematodes, namely strongylidoses of the digestive organs, attract attention. In the available literature, the significant spreading of these diseases in small ruminants is explained by the natural and climatic peculiarities of localities [2, 4, 16].

According to the survey conducted among farmers, it was found that in general not many farmers (11 %) used parasitological analysis as a tool to estimate the time of treatment, but rather relied on other factors such as previous experience (70 %). Only 15 % of respondents regularly checked their animals for parasites, while the majority of respondents did not pay any attention to the digestive organs' strongylidoses [6].

Helminthes' infestations are widespread in ruminant grazing and cause significant expenses because of production losses. Besides, anti-helminthic resistance (AR) in parasites is now widespread throughout Europe and poses a serious threat to the sustainability of modern ruminant farming. In particular, in Italy, several reports about AR in small ruminants against Levamisole, Ivermectin and Benzimidazoles have been published, but recent studies show that this phenomenon is spreading [11].

Reduced efficacy was observed in the treatment with all classes of anti-helminthic drugs used in Germany, but the treatment with Benzimidazoles and Moxidectin showed significantly worse results than Monepantel, the combination of Closantel and Mebendazole, and Levamisole [18]. The results of the conducted studies showed that Albendazole and Ivermectin showed a low efficacy (the percentage reduction at a level of 90 % and 92 %), while Tetramizole was more effective – 96.8 % [17]. An earlier study indicated that all tested anti-helminthics showed a significant ($P<0.05$) reduction in nematode eggs shedding in sheep after treatment. The fecal egg reduction rates (FECRT) for Albendazole, Tetramizole and Ivermectin made 97.2, 98.9 and 97.7 %, respectively [15].

The researchers concluded that the nematodes were resistant to the following preparations: Doramectin, Fenbendazole and Nitroxinil, and their combined use not only did not significantly improve the anti-helminthic efficacy against *Haemonchus* and *Cooperia*, but was also economically ineffective [7]. In Portugal, after the treatment of sheep and goats, it was found that gastro-intestinal parasites are resistant to Benzimidazoles [3].

During the research it was proved that the EE of Ivermequet 1 %, Closiveron and Levavet 10 % anti-helminthic preparations was at the level of 100 %. At the same time, group application of Brovalzen powder was ineffective (EE–50 %, IE–76.20 %). When using Albendazole 10% suspension, Combitrem emulsion, Brovalevamisole 8% powder and Univerm, as well as Albendazole-250 tablets and Brovalzen powder, the indicators of extensive and intensive effectiveness did not exceed 93.0 % (EE – 60–90 %, IE – 88.45–92.63 %) [12].

The aim of the study

The aim of the work was to establish the effectiveness of anti-helminthic preparations for sheep digestive tract strongylidoses.

The task of the study: to determine the therapeutic efficacy of anti-helminthic preparations for sheep digestive tract strongylidoses, taking into account the chemical group to which they belong and the method of their administration into the animal's body.

Materials and methods

The research was conducted in the summer-autumn period of 2024 at the laboratory of the Department of Parasitology and Veterinary and Sanitary Expert Examination of Poltava State Agrarian University.

The experimental studies were conducted on a private farm in Kirovohrad region on Romanivska sheep breed aged from 6 months to 2 years, spontaneously infested with gastro-intestinal strongyles' pathogens with an average degree of invasion (from 195.0 to 490.0 eggs/g of feces (EPG)). The animals' infestation was determined by the method of quantitative helminthic copro-ovoscopic examination [9].

Three experimental and one control groups of animals were formed, each consisting of ten animals.

The sheep of the *first experimental group* were injected subcutaneously with Closantel 10 % at a dose of 0.25 ml/10 kg of live weight once.

The animals of the *second experimental group* were injected subcutaneously with Doramax at a dose of 1 ml of the preparation per 50 kg of body weight once. Brovermectin 1 % was injected subcutaneously into the shoulder blade area of the third experimental group of sheep at a dose of 0.2 ml per 10 kg of body weight.

The sheep of the *control group* were not treated.

The animals of the experimental and control groups were kept in similar feeding and handling conditions during the study period. The effectiveness of the medicines was determined on the 7th and 14th day after their application. The indicators of the drugs' impact on sheep were the extensity effectiveness (EE) and intensity effectiveness (IE).

The effectiveness of the preparations was assessed according to the following indicators: above 98 % – a highly effective medicine; 90–98 % – effective; 80–89 % – moderately effective; below 80 % – insufficiently effective or ineffective [5].

Whitlock et al., 1980 suggest the following level of animal infestation with helminthes' eggs according to the international scale of ruminants' infestation: low infestation is 100, medium – up to 500, high – more than 500 EPG.

Results and discussion

According to our data, based on indicators of general clinical observations, it was found that after using the above mentioned anti-helminthics, no side effects were observed in animals during the experiment.

During the copro-ovoscopic examination of sheep, it was established that before de-helminthization of animals of the experimental and control groups, the prevalence of helminthic infection (EI) made 100% (**Table 1**). The sheep of the first experimental group were affected by strongyles of the digestive organs with invasion intensity (II) of 323.0 ± 89.9 eggs per 1 g of feces.

In the animals of the second experimental group II with strongyles of the digestive organs, the infestation was 321.0 ± 70.9 , in the third – 334.0 ± 97.9 , and in the control group – 358.0 ± 84.7 EPG. At the same time, in the control group of animals II increased on the 7th and 14th days and made 363.5 ± 79.9 and 367.2 ± 82.4 EPG, respectively.

Table 1

Therapeutic efficacy of anti-helminthics for digestive tract strongylidoses

Animal groups, preparations (n=10)	Before de-helminthization		7 days after de-helminthization		14 days after de-helminthization	
	II, specimens in 1 g of feces	EI, %	II, specimens in 1 g of feces	EI, %	II, specimens in 1 g of feces	EI, %
The first, Closantel 10 %	323.0 ± 89.9	100	1.5	10	-	-
The second, Doramax	321.0 ± 70.9	100	-	-	-	-
The third, Brovermectin 1 %	334.0 ± 97.9	100	-	-	-	-
Control	358.0 ± 84.7	100	363.5 ± 79.9	100	367.2 ± 82.4	100

On the 7th day of the experiment (**Fig. 1**), the eggs of strongyle type were recorded in one animal from the first experimental group (EE – 90.0 %; IE – 95.35 %), while macro-cyclic lactone preparations were 100 % effective.

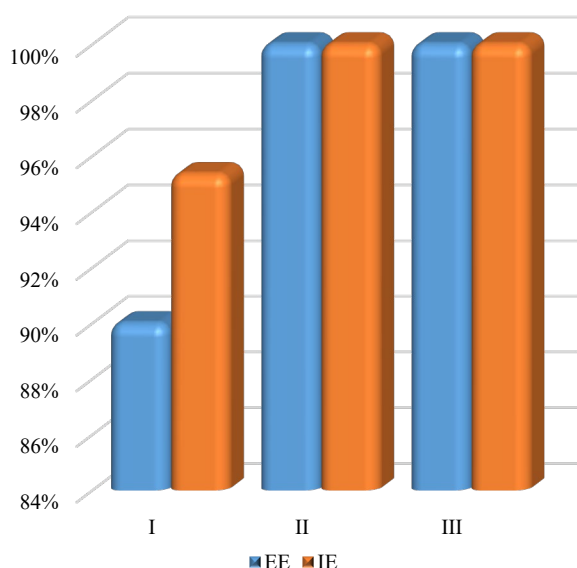


Fig. 1. Treatment effectiveness in sheep suffering from digestive tract strongylidoses on the 7th day of the experiment using:

I – Closantel 10 %, II – Doramax, III – Brovermectin 1 %

According to the coproovoscopic results, on the 14th day of the experiment (**Fig. 2**), all anti-helminthics, namely: Closantel 10 %, Doramax and Brovermectin 1 %, showed the highest efficacy (EE and IE – 100 %).

The analysis of literature sources shows that most scientific studies are devoted to assessing the effectiveness of anti-helminthic preparations against ruminants' digestive tract strongylidoses. For example, according to the author, the highest effectiveness of medicines for sheep was obtained at the use of anti-helminthics belonging to macrolides and combined agents (EE, IE – 100 %) [12].

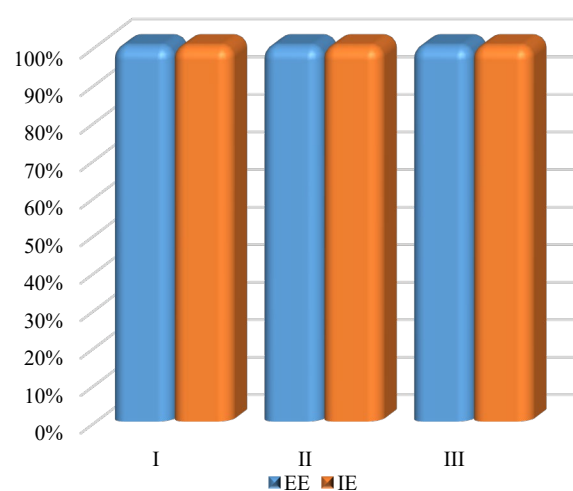


Fig. 2. Treatment effectiveness in sheep suffering from digestive tract strongylidoses on the 14th day of the experiment using:

I – Closantel 10 %, II – Doramax, III – Brovermectin 1 %

The studies have shown that on the 30th day of the experiment, the therapeutic effectiveness of Closafen and Closiveron for the treatment of gastro-intestinal strongylidoses reached 100 % [10]. The results of studying cattle showed that Fenzol 22 % anti-helminthic preparation demonstrated higher efficacy in comparison with Novoverm 1 % both in case of the digestive tract strongylidoses and for trichuriasis [20]. Analyzing in our studies the level of the preparations' effectiveness belonging to macrolides (Doramax and Brovermectin 1 %), their high effectiveness was established (EE, IE – 100 %). As for Closantel 10 %, its effectiveness on the 7th day of the experiment was lower (EE – 90.0 %; IE – 95.35 %) in comparison with other preparations. On the 14th day of the experiment, all the preparations showed 100 % effectiveness against gastro-intestinal strongyles.

The researchers note that according to the FECRT, resistance developed to the treatment of sheep with Closantel, Albendazole and Fenbendazole, administered separately and in combination to five groups of sheep, as

the mean percentage reduction in EPG made $\leq 95\%$ with a lower confidence limit of $\leq 90\%$ [1]. The studies conducted in India have shown marked resistance to Fenbendazole, Levamisole and Morantel. There was a moderate resistance to Ivermectin [8]. Anti-helminthic resistance is widespread among sheep in the Netherlands and includes products from all the major classes of anti-helminthics, except Levamisole [14]. Danish researchers note that the effectiveness of Ivermectin in case of gastro-intestinal strongylidoses is decreasing, which is connected with its long-term use for animals [13].

Thus, in the course of the conducted studies, the preparations based on Closantel and macro-cyclic lactones show 100% effectiveness on the 14th day after their application.

Conclusions

It was established that the tested medicines (Closantel 10 %, Doramax and Brovermectin 1 %) have nematocidal properties against the pathogens of sheep gastro-intestinal tract strongylidoses. It has been proven that the use of Closantel 10 %, Doramax and Brovermectin 1 % by parenteral administration leads to 100 % therapeutic efficacy.

Prospects for further research. In the future, it is planned to establish the disinvasive effectiveness of disinfectants against strongyloid type eggs.

Conflict of interest

The author state that there is no conflict of interest.

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